United Nations A/AC.105/709

General Assembly

Distr.: General
4 December 1998

Original: English

Committee on the Peaceful Uses of Outer Space

Report on the Workshop on the Evaluation of the United Nations/Swedish International Development Agency International Training Course Series on Remote Sensing Education for Educators

(Gaborone, Botswana, 18 to 21 October 1998)

Contents

		Paragraphs	Page
I.	Introduction	1-8	2
	A. Background and objectives	1-3	2
	B. Organization and programme	4-8	2
II.	Summary of the contents of the workshop	9	3
III.	Recommendations	10-12	3
IV.	Proposed follow-up actions	13-18	4

Tables

1.	Recommendations to participants of the Workshop acting as a group	5
2.	Recommendations to third parties	6
3.	Recommendations to individuals acting independently within their own settings	8

V.98-57878 (E)

I. Introduction

A. Background and objectives

1. The Workshop on the Evaluation of the United Nations/Swedish International Development Agency International Training Course Series on Remote Sensing Education for Educators, held in Gaborone, Botswana, from 18 to 21 October 1998, was organized by the United Nations Programme on Space Application in cooperation with the Government of Sweden. The idea to organize the workshop grew out of the recognition, based on evaluations carried out at the end of several of the United Nations international training courses on remote sensing education for educators (generally referred to as the United Nations/Sweden courses), that the needs of educators in remote sensing had evolved since the first course was held in 1990. It was therefore considered timely to assess how well the courses met current needs and to use the results of the assessment as a basis for proposing changes in course contents. The proposal to organize the workshop was made at the Seventh United Nations International Training Course on Remote Sensing Education for Educators held in 1997 (A/AC.105/678, para. 17).

2. The potential impact of the current course in spreading remote sensing education in developing countries can be compromised by a variety of local constraints. Consequently, the scope of the workshop was planned to include consideration not only of the contents and quality of the existing course relative to the on-the-job needs of educators but also of the full range of other factors that limit the efforts of educators at furthering remote sensing education. The principle objectives of the workshop were therefore to solicit feedback on the full spectrum of factors that impede remote sensing education and, on the basis of that feedback, to formulate recommendations and initiate appropriate actions to alleviate any existing difficulties. An additional objective was to provide a forum for the mutual exchange of experience on successful approaches to the development of remote sensing education. The workshop was co-sponsored by the Swedish International Development Agency (SIDA) on behalf of the Government of Sweden and was hosted by the Department of Physical Geography of Stockholm University and the Department of Environmental Science of the University of Botswana.

3. The present report describes the organization of the workshop, its recommendations and proposed follow-up actions. It has been prepared for the Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Subcommittee.

B. Organization and programme

4. Participation in the workshop was limited to graduates from African institutions since, based on feedback over the years, the region presented some of the more significant challenges to remote sensing education. Taking into account the assessment nature of the workshop, it was made open only to those graduates having at least two years of experience following the course in Sweden. Invitations were extended to all 78 graduates from African institutions who attended the course between 1990 and 1996. As a condition of their participation in the workshop, graduates were required to write a paper detailing their experiences at promoting remote sensing education, placing emphasis on the identification of factors that were critical to both their successes and failures.

5. Thirty-five graduates who submitted papers were retained as participants for the workshop; thirty-two were able to attend the workshop. They were nationals of the following 16 countries: Algeria, Burundi, Cameroon, Egypt, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Nigeria, Senegal, Swaziland, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. Funds for the international travel of five participants and their boarding and lodging were provided from the fellowship budget of the United Nations Programme on Space Applications. Funds for the international travel as well as boarding and lodging of the remaining 27 participants were provided by the Government of Sweden.

6. Workshop instructors and speakers came from several institutions, including the Office for Outer Space Affairs, the European Space Agency (ESA), Stockholm University, the University of Botswana and private industry.

7. The programme of the workshop was finalized following an analysis of the 35 papers. To ensure maximum interactivity and participation, the workshop was organized as a series of panel discussions in which each participant was assigned one or more formal roles as panellist and/or rapporteur. Each panel focused on a specific theme covering several related factors that the participants had identified in their papers as being critical to their successes or failures.

8. Panel discussions focused not only on gaining an understanding of the constraints hindering the development of remote sensing education but also on concrete proposals for alleviating such constraints. Proposals made at each panel discussion were compiled into a single list and workshop participants were required to grade the importance and relevance of each proposal in alleviating conditions within their particular local settings. This allowed ready identification of a limited number of priority proposals which, for the majority of participants, would be the most useful in furthering the local development of remote sensing education.

II. Summary of the contents of the workshop

9. The first day of the workshop was reserved for technical presentations. These included presentations by invited speakers from Stockholm University, the University of Botswana, ESA and the Office for Outer Space Affairs. Oral presentations on the status of remote sensing education in several countries, as well as poster presentations on ongoing research activities were given by workshop participants. The second day included three panel discussions on the following themes: local development of remote sensing curricula; access to teaching and research materials; and professional development and trained staff. Presentations were also made by several workshop participants on the status of remote sensing education in their institutions and countries. On the third day, the panel discussions focused on the following: sharing of experiences; enlisting local support and funding; and strong points and shortcomings of the current course. Presentation, discussion and adoption of recommendations and proposals emanating from the panel discussions were carried out partly on the third and fourth days of the workshop. The greater part of the morning of the fourth day was spent visiting the remote sensing and geographic information system (GIS) laboratories of the University of Botswana, where participants had the opportunity to undertake computer-based hands-on exercises. The afternoon was spent on a field visit to a geological study area near the village of Manyana, several kilometres distant from the city of Gaborone.

III. Recommendations

10. The problems enumerated and their proposed solutions, grouped into major categories according to the persons or entities proposed for initiating remedial actions, are presented in tables 1, 2 and 3. Implementation of the proposals in table 1 requires coordinated action on the part of graduates of the United Nations/Sweden training course, acting as a group. Proposals in table 2 require action on the part of national and international entities. Proposals in table 3 concern actions that are principally the responsibility of individuals, acting more or less independently.

11. In table 1, the major problems to be tackled by the participants themselves, acting as a group, relate mainly to the following: (a) insufficient access to information (e.g. on remote sensing developments, training opportunities, appropriate curriculum development); (b) insufficient access to satellite imagery; and (c) lack of political support. All participants considered those problems to be significant in their own work settings and graded the proposed solutions to be high in importance and applicability to their situations (from 65 to 94 per cent were graded in the "high" category). The proposals that they felt would alleviate present conditions call for the establishment of a formal association of educators of remote sensing in Africa and the creation of a Website.

12. Proposals for the solution of the major problems cited in table 2 require interventions by the parties currently involved in the organization of the present course in Sweden (Office for Outer Space Affairs, SIDA, Stockholm University and ESA). The problems are: (a) minor shortcomings of the present course, specifically with regard to the limited time allotted to curriculum development and to practical exercises; and (b) the general need for more opportunities for advanced training in remote sensing. The proposed solutions call for the course organizers to explore the possibility of enhancing those components of the present course that deal with curriculum development and practical exercises as well as to introduce a new advanced course in remote sensing. The recommendation addressed to ESA concerns the provision of opportunities to former graduates and others to acquire advanced knowledge in remote sensing and GIS techniques. This could be accomplished through a competitive arrangement that would allow interested educators to formulate project proposals and, if selected, to carry out a clearly defined work programme at ESA. Two recommendations addressed to

the Office for Outer Space Affairs, namely the establishment of a programme of assistance to provide educators with limited start-up funds and/or equipment and materials and the creation of regional centres of excellence in remote sensing, had already been acted upon before the workshop, although many participants were unaware of those activities owing to lack of access to information on them.

IV. Proposed follow-up actions

13. The establishment of an association of remote sensing educators was considered to be of such high priority by the overwhelming majority of participants that they took the initial steps in its creation during the workshop. Actions taken included the election of several regional councillors who would contribute to the development of the statutes of the association and plan its initial activities (as an initial event, a technical workshop is planned to take place by the end of 1999). In addition, each participant made a financial contribution to cover the miscellaneous office expenses of the councillors. The Office for Outer Space Affairs plans to play an active role in supporting the future activities of the association. In particular, it will provide a sub-Website at its Internet address (www.un.or.at/oosa) in order to meet the specific needs identified earlier in the present report (see table 2).

14. The Office for Outer Space Affairs will undertake discussions with the various entities mentioned in the recommendations contained in table 2 (SIDA, Stockholm University, ESA, United Nations Development Programme (UNDP) with a view to facilitating and implementing the proposed solutions within a reasonable time-frame. Stockholm University has since reported that it has implemented several changes in the planned programme of the 1999 Ninth United Nations International Training Course on Remote Sensing Education for Educators, in conformity with the conclusions of the workshop. The changes include placing more emphasis on curriculum development and including more practical exercises, particularly those related to GIS and digital image processing. In addition, the set of teaching materials given to participants will be enhanced to include, among others, multiple copies of printed satellite images.

15. Initial discussions between the representatives of the Office for Outer Space Affairs and ESA at the workshop revealed that educators selected for ESA fellowships would be able to extract the greatest benefit from ESA laboratory facilities and available technical expertise if the award of fellowships were made conditional on the preparation of technically sound, well-reasoned project proposals. Under such an arrangement, selected educators would be required, during a first phase, to collect all locally available project materials while still at their home institutions and to initiate appropriate contacts with ESA laboratories in order to refine their subsequent work programme. The second phase would be a six-month period of study at ESA facilities, during which the emphasis would be on carrying out the pre-defined analytical and processing components of the work programme which, for a variety of reasons (e.g. lack of access to equipment or images), could not be undertaken at the educators' home institutions. The final phase would consist of preparation of a final project report by fellowship holders on their return home. The Office for Outer Space Affairs will continue discussions in 1999 with ESA on the details of implementation of the fellowship programme.

16. The Office for Outer Space Affairs will also specifically explore with SIDA and Stockholm University how the outcome of the workshop could be used to benefit graduates of the course from geographic regions other than Africa.

17. In view of the many local obstacles noted by educators of remote sensing in Africa and the lack of understanding or awareness by the public and decision makers of a technology that has significant impact on social and economic development, the Office for Outer Space Affairs has proposed the implementation of a high-level programme of awareness building on a country-by-country basis. As presently envisaged, representatives of the Office for Outer Space Affairs and SIDA will visit selected countries in Africa and meet with high-ranking officials from the Government and universities to discuss ways in which many of the local obstacles could be overcome in order to put to good use the value of the training received from the Government of Sweden. The proposal will be discussed with SIDA in 1999.

18. The proceedings of the workshop will be published and distributed by Stockholm University in collaboration with the Office for Outer Space Affairs. Volume II of the proceedings, which consists of a compilation of all papers submitted, was made available to participants at the beginning of the workshop. Volume I will contain the introductory papers presented on the opening day of the workshop as well as a summary of its recommendations and proposed follow-up plans.

Table 1
Recommendations to participants of the Workshop acting as a group

Major problem	*Recommendation*	*Grading*[1]			
		H	*M*	*L*	*X*
Insufficient access to satellite imagery for teaching and research purposes	Create an association of remote sensing educators and subsequently lobby space agencies (e.g. ESA) and other providers of satellite data for preferential access to satellite imagery for educational and research purposes in Africa	29	1	1	0
Insufficient networking, cooperation and collaboration	Create an association of remote sensing educators	27	3	1	0
Lack of reliable and efficient access to information on remote sensing developments	Publish a bi-annual to annual newsletter (via e-mail or regular mail, as necessary)	20	7	4	0
	Create an association of remote sensing educators to facilitate information access	26	4	1	0
Lack of political support	Create an association of remote sensing educators to lobby for support	21	6	4	0
Limited access to information on training opportunities to address problems of insufficient skilled manpower	Establish a Website to provide relevant information (with the assistance of the Office for Outer Space Affairs)	21	8	2	0
Insufficient access to information on the development of appropriate curricula for remote sensing and GIS	Establish a Website to provide relevant information (with the assistance of the Office for Outer Space Affairs and Stockholm University)	23	5	3	0

[1] H, M and L denote high, medium and low gradings, respectively. Gradings reflect participants' evaluations of the importance and applicability of the proposed solutions in alleviating given problems within their own settings. X denotes cases where participants considered that a given problem did not exist or was considered insignificant within or irrelevant to their own settings.

Table 2
Recommendations to third parties

Major problem	*Recommendation (specified third parties)*	*Grading*[1]			
		H	*M*	*L*	*X*
Insufficient access to information on the development of appropriate curricula for remote sensing and GIS	Enhance the curriculum development component of the United Nations/Sweden course (Office for Outer Space Affairs/SIDA)	13	17	1	0
Insufficient personnel skilled in remote sensing	Organization of an additional short course on remote sensing to fulfil the demand (Office for Outer Space Affairs/SIDA)	18	12	1	0
	Allow technicians (who assist teachers) to participate in the existing course (Office for Outer Space Affairs/SIDA)	10	16	5	0
Insufficient access to regional remote sensing centres of excellence	Establish centrally placed subregional remote sensing centres to cater for all users (Office for Outer Space Affairs/SIDA) (Morocco and Nigeria now host regional centres)	18	9	3	1
Shortcomings of the current content of the United Nations/Sweden course	Increase the time devoted to the theoretical and practical aspects of GIS (Office for Outer Space Affairs/SIDA)	25	5	1	0
	Provide a separate advance course and/or opportunities for more advanced training in remote sensing (Office for Outer Space Affairs/SIDA/ESA)	18	9	4	0
Disadvantages of having Sweden as the location of the United Nations/Sweden course (e.g. lack of similar facilities at home institutions)	Retain the course location in Sweden; benefits outweigh the disadvantages (SIDA/Office for Outer Space Affairs)	24	6	1	0

Major problem	*Recommendation (specified third parties)*	*Grading*[1]			
		H	*M*	*L*	*X*
Insufficient funding/ sponsorship	Provide appropriate opportunities for educators to undertake advanced project-based studies in remote sensing (ESA)	25	6	0	0
	Provide opportunities for educators to obtain limited start-up funds and/or equipment and materials (Office for Outer Space Affairs, UNDP)	21	10	0	0

[1] H, M and L denote high, medium and low gradings, respectively. Gradings reflect participants' evaluations of the importance and applicability of the proposed solutions in alleviating given problems within their own settings. X denotes cases where participants considered that a given problem did not exist or was considered insignificant within or irrelevant to their own settings.

Table 3
Recommendations to individuals acting independently within their own settings

Major problem	*Recommendations*	*Grading*[1]			
		H	*M*	*L*	*X*
Inadequate infrastructure (e.g. library/laboratory space)	Create a centralized facility at institutions (with unbiased leadership)	13	11	5	2
Lack of literature (e.g. books and journals) and equipment (e.g. computer hardware and software; equipment for cartography and for fieldwork)	Acquire through self-initiative (e.g. linkages, collaboration) and through appropriate organizations (e.g. United Nations, UNDP, ESA)	20	11	0	0
	Explore existing possibilities in each country (e.g. institutions, research funds)	19	9	3	0
Lack of efficient and reliable communication	Make efforts to get connected to the Internet	13	10	6	2
	Solicit newsletters from various remote sensing organizations (e.g. ESA, Swedish Space Corporation)	16	14	1	0
Insufficient networking, cooperation and collaboration	Institutions should draw up memoranda of understanding (e.g. to share materials and to pursue collaborative research)	13	15	3	0
Insufficient funding/ sponsorship	Obtain funds from national Governments, non-governmental organizations, and private individuals through projects/ consultancies that include a training component	14	13	3	1
	Improve, through appropriately linked programmes, programmes with other universities	15	12	3	1
Lack of awareness among the public and among decision makers	Create interest in remote sensing from the grass-roots level upwards (include decision makers) through workshops, seminars, dissemination of research results and informal relationships, as well as through the use of teachers and other professionals	22	9	0	0

Major problem	*Recommendations*	*Grading*[1]			
		H	*M*	*L*	*X*
	Encourage the private sector to be involved in remote sensing projects that include students working on attachment	23	5	3	0
Lack of political support	Participants to be more proactive in soliciting support by acting in an advisory capacity to local governments	13	15	3	0
Insufficient time to carry out research activities in remote sensing	Lobby institutions to rationalize teaching and administrative loads to facilitate research	7	15	5	4
Diversion of research funds for uses other than the intended purposes	Lobby institutions to use research grants for the specified purposes	10	11	5	5

[1] H, M and L denote high, medium and low gradings, respectively. Gradings reflect participants' evaluations of the importance and applicability of the proposed solutions in alleviating given problems within their own settings. X denotes cases where participants considered that a given problem did not exist or was considered insignificant within or irrelevant to their own settings.